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L23: Entry 1 of 1

File: USPT

Jan 20, 1987

DOCUMENT-IDENTIFIER: US 4637861 A

TITLE: Stabilized, lipid membrane-based device and method of analysis

Detailed Description Text (12):

Illustrative electrically conductive, solid substrates include, but are not limited to, a conductive metal such as silver, platinum and gold, or electrolytic glassy carbon. Electrolytic glassy carbon is prepared by cutting crystalline carbon material along a crystal plane, polishing the cut carbon material, and treating the polished material so that it will function as an electrode in an aqueous solution. Each of these exemplary electrically conductive, solid substrates is amenable to surface modification that provides reactive binding sites.

Detailed Description Text (18):

Surface modification of the electrically conductive, solid support to provide reactive binding sites can be accomplished through conventional oxidation or nitridation. Oxidation yields hydroxyl binding sites, and nitridation gives nitrogen-containing binding sites. Other possibilities for the reactive binding sites include --SH moieties. For example, a platinum substrate may be oxidized with a plasma torch in presence of oxygen, or with aqua regia followed by hydrogen peroxide; a silver substrate may be oxidized with an aqueous solution of about 5% sodium hydroxide; and a glassy carbon surface may be thermally baked at a very elevated temperature in the presence of oxygen.

Detailed Description Text (36):

An electrolytic, glassy carbon surface is thermally baked at 800.degree. C. in the presence of oxygen. Using electron spectroscopy to monitor the progress of the oxidation, the oxidation is controlled to yield a hydroxyl group density in which the hydroxyl groups are spaced approximately 0.4 nm.² apart. After the precursor lipid compound has been anchored to the support, this density will permit axial rotation of the lipid about the anchored, C-2 chain, and yet will provide a lipid molecular packing density that provides relatively high ion impermeability to the membrane.

Detailed Description Text (37):

Under anhydrous conditions, the precursor lipid compound is reacted with the hydroxyl binding sites on the oxidized glassy carbon support, in a twofold excess relative to the number of binding sites on the support. Afterwards, a 50 .ANG..times.50 .ANG. cross-sectional area density of concanavalin A not exceeding more than 50% of the surface of the lipid membrane, is adsorbed by hydrophobic effects into the membrane, to produce a stabilized, lipid membrane-based device in accordance with the present invention.

Detailed Description Text (47):

A liquid electrochemical cell 30, as diagrammatically shown in FIG. 4, is prepared using lipid membrane-based device 10 of Example 2, a reference electrode 32 (a platinum microelectrode), a bridge measurement device 34 (a capacitance bridge), and an electrolyte 36 (0.1M KCL at pH 7). An AC potential of +/-25 mV is applied from a power supply 38 at a frequency of 100 hertz. Cell 30 is employed using several known concentrations of dextran to prepare a calibration curve. Then an aqueous sample containing an unknown concentration of dextran is introduced into the electrochemical cell, the capacitance change is measured, and the concentration of dextran is determined to be 10.⁻⁶ M by comparison of the capacitance change with the calibration curve.

CLAIMS:

3. The device of claim 2, wherein said electrically conductive, solid substrate is electrolytic glassy carbon.

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L25: Entry 3 of 19

File: USPT

Aug 13, 2002

DOCUMENT-IDENTIFIER: US 6432579 B1

TITLE: Method of manufacturing secondary battery negative electrodeBrief Summary Text (4):

The present invention relates to an anode for a secondary battery using, as an electrode material, a sintered material which contains silicon as an active material, a process for producing the same, and a non-aqueous secondary battery using the same.

Brief Summary Text (6):

With the popularization of portable telephones and note-type personal computers, high-capacity lithium secondary batteries containing a cathode active material and an anode active material, capable of incorporating and releasing lithium ions, have attracted special interest. Among them, demands for space-saved, thin square-shaped batteries have been particularly enhanced. For the purpose of enhancing the efficiency of the battery reaction by increasing the electrode area, a cathode and an anode obtained by coating a belt-shaped metal foil with a coating composition containing an active material, a binder and a conductive material are used in a current square-shaped battery, and these electrodes are contained in a battery can after winding, together with a separator, and pressing.

Brief Summary Text (7):

This electrode is composed of about 40% by volume of an active material, 20 to 30% by volume of a binder, a conductive material and a metal foil, and 30 to 40% by volume of pores. Accordingly, there is a problem that those which do not contribute intrinsically to the capacity of the battery, such as binder, conductive material and metal foil limit the battery capacity per volume. When the wound electrodes described above are contained in the square-shaped can, it is impossible to fill corner portions of the battery and a useless space is formed. Therefore, the capacity per unit volume is further lowered.

Brief Summary Text (8):

Thus, a trial of forming the electrode of a sintered material made substantially of an active material has been made as a means for increasing the capacity per unit volume. When the electrode is formed of the sintered material, it is possible to eliminate the binder and to eliminate the conductive material or to reduce its amount, thereby making it possible to increase the filling density of the active material and to enhance the capacity per unit volume. For example, Japanese Patent Laid-Open Publication No. 5-299090 discloses an anode obtained by contact-bonding of a copper foil to a sintered material of a petroleum pitch or a carbonaceous material, while Japanese Patent Laid-Open Publication No. 8-180904 discloses a cathode formed of a sintered material of a composite oxide containing lithium and metal.

Brief Summary Text (9):

As the anode active material, carbon materials, for example, amorphous carbon such as coke (e.g. Japanese Patent Laid-Open Publication No. 62-122066 and 1-204361) and glassy carbon (e.g. Japanese Patent Laid-Open Publication No. 2-66856); and natural graphite (e.g. Japanese Patent Publication No. 62-23433) or artificial graphite (e.g. Japanese Patent Laid-Open Publication No. 4-190555) have been suggested. However, the battery capacity per unit volume is not sufficient even in case where any of amorphous and crystalline carbon materials is used and, therefore, a further improvement in performance is desired.

Brief Summary Text (12):

In view of the requisite capacity in case of using in the portable telephone, the base area of the electrode is preferably 4 cm.sup.2 or more because of limitation of the thickness of the battery.

Brief Summary Text (29) :

The anode material used in the present invention is preferably a composite powder including the carbon material. The composite powder is made by subjecting silicon or its compound to a heat treatment in a non-oxidizing atmosphere at a temperature within a range where silicon is not molten and sufficient sintering can be conducted, for example, 600 to 1400.degree. C., preferably 800 to 1200.degree. C. in the presence of a carbon material or a material to be carbonized by the heat treatment. The carbon material used herein includes, for example, coke, glassy carbon, graphite, carbonized pitch, and a mixture thereof.

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